

09/806300

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
REQUEST FOR FILING NATIONAL PHASE OF
PCT APPLICATION UNDER 35 U.S.C. 371 AND 37 CFR 1.494 OR 1.495

To: Hon. Commissioner of Patents
Washington, D.C. 20231



00909

TRANSMITTAL LETTER TO THE UNITED STATES
DESIGNATED/ELECTED OFFICE (DO/EO/US)

Atty Dkt: P 277884 /2980504US/VK/her
M# /Client Ref.

From: Pillsbury Winthrop LLP, IP Group:

Date: March 29, 2001

This is a **REQUEST** for **FILING** a PCT/USA National Phase Application based on:

- | | | |
|---|--|--|
| 1. International Application
<u>PCT/FI99/00796</u>
↑ country code | 2. International Filing Date
<u>28</u> <u>September</u> <u>1999</u>
Day MONTH Year | 3. Earliest Priority Date Claimed
<u>29</u> <u>September</u> <u>1998</u>
Day MONTH Year
(use item 2 if no earlier priority) |
|---|--|--|
4. Measured from the earliest priority date in item 3, this PCT/USA National Phase Application Request is being filed within:
(a) ☐ 20 months from above item 3 date (b) ☒ 30 months from above item 3 date,
(c) Therefore, the due date (unextendable) is March 29, 2001
5. Title of Invention METHOD AND ARRANGEMENT FOR REPORTING CREDIT/CHARGING INFORMATION TO A MOBILE COMMUNICATION STATION
6. Inventor(s) LINDEMANN, Klaus

Applicant herewith submits the following under 35 U.S.C. 371 to effect filing:

7. ☒ Please immediately start national examination procedures (35 U.S.C. 371 (f)).
8. ☐ A copy of the International Application as filed (35 U.S.C. 371(c)(2)) is transmitted herewith (file if in English but, if in foreign language, file only if not transmitted to PTO by the International Bureau) including:
a. ☐ Request;
b. ☐ Abstract;
c. pgs. Spec. and Claims;
d. sheet(s) Drawing which are ☐ informal ☐ formal of size ☐ A4 ☐ 11"
9. ☒ A copy of the International Application has been transmitted by the International Bureau.
10. A translation of the International Application into English (35 U.S.C. 371(c)(2))
a. ☒ is transmitted herewith including: (1) ☒ Request; (2) ☒ Abstract;
(3) 9 pgs. Spec. and Claims;
(4) 1 sheet(s) Drawing which are:
☐ informal ☒ formal of size ☒ A4 ☐ 11"
b. ☐ is not required, as the application was filed in English.
c. ☐ is not herewith, but will be filed when required by the forthcoming PTO Missing Requirements Notice per Rule 494(c) if box 4(a) is X'd or Rule 495(c) if box 4(b) is X'd.
d. ☐ Translation verification attached (not required now).

RE: USA National Phase Filing of PCT /FI99/00796

11. ☒ Please see the attached Preliminary Amendment
12. ☐ Amendments to the claims of the International Application **under PCT Article 19 (35 U.S.C. 371(c)(3)), i.e., before 18th month from first priority date above in item 3, are transmitted herewith (file only if in English) including:**
13. ☒ PCT Article 19 claim amendments (if any) have been transmitted by the International Bureau
14. ☐ Translation of the amendments to the claims **under PCT Article 19 (35 U.S.C. 371(c)(3)), i.e., of claim amendments made before 18th month, is attached (required by 20th month from the date in item 3 if box 4(a) above is X'd, or 30th month if box 4(b) is X'd, or else amendments will be considered canceled).**
15. **A declaration of the inventor (35 U.S.C. 371(c)(4))**
 a. ☐ is submitted herewith ☐ Original ☐ Facsimile/Copy
 b. ☒ is not herewith, but will be filed when required by the forthcoming PTO Missing Requirements Notice per Rule 494(c) if box 4(a) is X'd or Rule 495(c) if box 4(b) is X'd.
16. **An International Search Report (ISR):**
 a. Was prepared by ☐ European Patent Office ☐ Japanese Patent Office ☒ Other
 b. ☒ has been transmitted by the international Bureau to PTO.
 c. ☒ copy herewith (2 pg(s).) ☒ plus Annex of family members (1 pg(s).).
17. **International Preliminary Examination Report (IPER):**
 a. ☒ has been transmitted (if this letter is filed after 28 months from date in item 3) in English by the International Bureau with Annexes (if any) in original language.
 b. ☒ copy herewith in English.
 c.1 ☐ IPER Annex(es) in original language ("Annexes" are amendments made to claims/spec/drawings during Examination) including attached amended:
 c.2 ☐ Specification/claim pages # ___ claims # ___
 Dwg Sheets # ___
 d. ☐ Translation of Annex(es) to IPER **(required by 30th month due date, or else annexed amendments will be considered canceled).**
18. **Information Disclosure Statement including:**
 a. ☒ Attached Form PTO-1449 listing documents
 b. ☒ Attached copies of documents listed on Form PTO-1449
 c. ☒ A concise explanation of relevance of ISR references is given in the ISR.
19. ☐ **Assignment** document and Cover Sheet for recording are attached. Please mail the recorded assignment document back to the person whose signature, name and address appear at the end of this letter.
20. ☐ Copy of Power to IA agent.
21. ☐ **Drawings** (complete only if 8d or 10a(4) not completed): ___ sheet(s) per set: ☐ 1 set informal; ☐ Formal of size ☐ A4 ☐ 11"
22. Small Entity Status ☒ is **Not** claimed ☐ is claimed (**pre-filing confirmation required**)
- 22(a) (No.) Small Entity Statement(s) enclosed (since 9/8/00 Small Entity Statements(s) not essential to make claim)
23. **Priority** is hereby claimed under 35 U.S.C. 119/365 based on the priority claim and the certified copy, both filed in the International Application during the international stage based on the filing in (country) FINLAND of:
- | | <u>Application No.</u> | <u>Filing Date</u> | | <u>Application No.</u> | <u>Filing Date</u> |
|-----|------------------------|--------------------|-----|------------------------|--------------------|
| (1) | 982098 | Sept. 29, 1998 | (2) | | |
| (3) | | | (4) | | |
| (5) | | | (6) | | |
- a. ☒ See Form PCT/IB/304 sent to US/DO with copy of priority documents. If copy has not been received, please proceed promptly to obtain same from the IB.

b. ☐ Copy of Form PCT/IB/304 attached.

Page 3 of 3

RE: USA National Phase Filing of PCT/FI99/00796

24. Attached: Preliminary Amendment

25 Per Item 17.c2, cancel original pages # __, claims # __, Drawing Sheets #

26. Calculation of the U.S. National Fee (35 U.S.C. 371 (c)(1)) and other fees is as follows:

Based on amended claim(s) per above item(s) ☐ 12, ☐ 14, ☐ 17, ☐ 25 (hilitte)

Total Effective Claims	minus 20 =	x \$18/\$9 =	\$0	966/967
Independent Claims	minus 3 =	x \$80/\$40 =	\$0	964/965
If any proper (ignore improper) Multiple Dependent claim is present,		add\$270/\$135	+0	968/969

BASIC NATIONAL FEE (37 CFR 1.492(a)(1)-(4)): →→ **BASIC FEE REQUIRED, NOW** →→→→

A. If country code letters in item 1 are not "US", "BR", "BB", "TT", "MX", "IL", "NZ", "IN" or "ZA"

See item 16 re:

1. Search Report was not prepared by EPO or JPO -----	add\$1000/\$500		960/961
2. Search Report was prepared by EPO or JPO -----	add\$860/\$430	+1000	970/971

SKIP B, C, D AND E UNLESS country code letters in item 1 are "US", "BR", "BB", "TT", "MX", "IL", "NZ", "IN" or "ZA"

→ <input type="checkbox"/> B. If USPTO did not issue both International Search Report (ISR) and (if box 4(b) above is X'd) the International Examination Report (IPER), -----	add\$970/\$485	+0	960/961
(only) → <input type="checkbox"/> C. If USPTO issued ISR but not IPER (or box 4(a) above is X'd), -----	add\$710/\$355	+0	958/959
(these) (4) → <input type="checkbox"/> D. If USPTO issued IPER but IPER Sec. V boxes <u>not all</u> 3 YES, -----	add\$690/\$345	+0	956/957
→ <input type="checkbox"/> E. If international preliminary examination fee was paid to USPTO and Rules 492(a)(4) and 496(b) <u>satisfied</u> (IPER Sec. V <u>all</u> 3 boxes YES for <u>all</u> claims), -----	add \$100/\$50	+0	962/963

27. **SUBTOTAL =** \$1000

28. If Assignment box 19 above is X'd, add Assignment Recording fee of ----\$40 +0 (581)

29. Attached is a check to cover the ----- **TOTAL FEES** \$1000

Our Deposit Account No. 03-3975

Our Order No. 60258 | 277884
C# M#



00909

CHARGE STATEMENT: The Commissioner is hereby authorized to charge any fee specifically authorized hereafter, or any missing or insufficient fee(s) filed, or asserted to be filed, or which should have been filed herewith or concerning any paper filed hereafter, and which may be required under Rules 16-18 and 492 (missing or insufficient fee only) now or hereafter relative to this application and the resulting Official document under Rule 20, or credit any overpayment, to our Account/Order Nos. shown above for which purpose a duplicate copy of this sheet is attached.

This CHARGE STATEMENT does not authorize charge of the issue fee until/unless an issue fee transmittal form is filed

Pillsbury Winthrop LLP
Intellectual Property Group

By Atty: Christine H. McCarthy

Reg. No. 41844

Sig: [Signature]

Fax: (202) 822-0944
Tel: (202) 861-3075

Atty/Sec: CHM/mhn

NOTE: File in duplicate with 2 postcard receipts (PAT-103) & attachments.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re PATENT APPLICATION OF

Confirmation No.: Not Yet Assigned

LINDEMANN

Group Art Unit: Not Yet Assigned

Appln. No.: Not Yet Assigned

Examiner: Not Yet Assigned

Filed: Herewith

Title: METHOD AND ARRANGEMENT FOR REPORTING
CREDIT/CHARGING INFORMATION TO A MOBILE
COMMUNICATION STATION (As Amended)

March 19, 2001

* * * * *

PRELIMINARY AMENDMENT

Hon. Commissioner of Patents
Washington, D.C. 20231

Sir:

Kindly preliminary amend the above-referenced application as follows:

IN THE TITLE:

Please delete the present title and replace it with the following new title:

--METHOD AND ARRANGEMENT FOR REPORTING

CREDIT/CHARGING INFORMATION TO A MOBILE COMMUNICATION
STATION--.

IN THE SPECIFICATION:

At the top of the first page, just under the title, insert

--This application is the National Phase of International Application
PCT/FI99/00796 filed September 28, 1999 which designated the U.S. and that
International Application was published under PCT Article 21(2) in English.--

IN THE CLAIMS:

Please enter the following amended claims:

1. (*Amended*) A method for transmitting charging information to a mobile station, the method comprising:

detecting a call termination of a call chargeable to a subscriber of the mobile station;

sending charging information to the mobile station as a connectionless message upon the detection of the call termination.
2. (*Amended*) The method of claim 1, further comprising:

defining an upper limit for an accumulated price of telephone calls;

monitoring the accumulated price of telephone calls;

allowing a new call only if the accumulated price of telephone calls is less than the upper limit.
3. (*Amended*) The method of claim 1, wherein the connectionless message is a short message.
4. (*Amended*) The method of claim 1, wherein the connectionless message is a Unstructured Supplementary Service Data message.
5. (*Amended*) The method of claim 1, further comprising, releasing the call with sufficient delay to allow sending the connectionless message without paging the mobile station separately after detecting the termination of the call.

6. (*Amended*) The method of claim 1, further comprising:
requesting a Mobile Services Switching Centre to report the termination of the call from an Intelligent Network node;
reporting the termination of the call from the Mobile Services Switching Centre; and
determining and sending the charging information to the mobile station.

7. (*Amended*) The method of claim 1, further comprising:
executing a Service Logic Program in a Service Logic Execution Environment to send the charging information at a Service Control Point; and
communicating with an external process through a gateway between services running inside the Service Logic Execution Environment and an external application, wherein the charging information is sent using the gateway to the external application and subsequently to the mobile station.

8. (*Amended*) An arrangement for transmitting charging information to a mobile station in a mobile telecommunications network, wherein the arrangement is configured to detect a termination of a call chargeable to a subscriber of the mobile station and , in response to that detection, send the charging information to the mobile station as a connectionless message.

9. (*Amended*) The arrangement of claim 8, comprising a Service Control Point of an Intelligent Network, the Service Control Point including a Service Logic

Program configured to send the charging information in response to detection of the call termination.

10. (*Amended*) The arrangement of claim 9, further comprising a separate processor configured to format the charging information.

See the attached Appendix for the changes made to effect the above claims.

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REMARKS

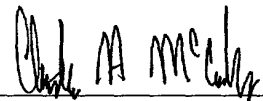
Claims 1-10 are pending. By this preliminary amendment, claims 1-10 have been amended (total number of claims 10) to merely clarify the recited subject matter, and the specification has been amended to identify priority data. Claims 1 and 8 are independent claims.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached Appendix is captioned "Version with markings to show changes made".

Early and favorable action on the merits are respectfully requested.

Respectfully submitted,

Pillsbury Winthrop, LLP

By: 

Christine H. McCarthy

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Washington, DC 20005-3918
(202) 861-3000
Enclosure: Appendix

APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE TITLE:

The title is changed as follows:

METHOD AND ARRANGEMENT FOR REPORTING
CREDIT/CHARGING INFORMATION TO A MOBILE COMMUNICATION
[SUBSCRIBER] STATION

IN THE SPECIFICATION:

The following paragraph was added to the beginning of the specification.

This application is the National Phase of International Application
PCT/FI99/00796 filed September 28, 1999 which designated the U.S. and that
International Application was published under PCT Article 21(2) in English.

IN THE CLAIMS:

1. (*Amended*) A method for transmitting [credit/charging] charging
information to a mobile station [(MS)];
c h a r a c t e r i z e d in that the method comprises the steps of] , the method
comprising:
detecting a call termination [(2-10)] of a call chargeable to [the] a subscriber
of the mobile station [(MS)];
[in response to said detecting,] sending [said credit/charging] charging
information to the mobile station [(MS)] as a connectionless message [(2-26)] upon
the detection of the call termination.

2. (*Amended*) The [A] method [according to] of claim 1, [characterized in that the method] further [comprises the steps of] comprising:

defining an upper limit for [the] an accumulated price of telephone calls;

monitoring the accumulated price of telephone calls;

allowing a new call only if the accumulated price of telephone calls is less than the upper limit.

3. (*Amended*) The [A] method [according to any of the preceding claims, characterized in that said] of claim 1, wherein the connectionless message is a short message.

4. (*Amended*) The [A] method [according to any of the preceding claims, characterized in that said] of claim 1, wherein the connectionless message is a [USSD] Unstructured Supplementary Service Data message.

5. (*Amended*) The [A] method [according to any of the preceding claims, characterized in that said after detecting said termination (2-10) of the call] of claim 1, further comprising, releasing the call [(2-18)] with sufficient delay [for] to allow sending [said] the connectionless message without paging the mobile station [(MS)] separately after detecting the termination of the call.

6. (*Amended*) The [A] method [according to any of the preceding claims, characterized in that said an Intelligent Network node, preferably a Service Control Point (SCP)] of claim 1, further comprising:

[requests (2-4)] requesting a Mobile Services Switching Centre [(MSC)] to report [said] the termination of the call from an Intelligent Network node;

reporting the termination of the call from the Mobile Services Switching Centre; and

[in response to said reporting (2-12), initiates (2-16, 2-22) said] determining and sending [of said] the [credit/charging] charging information to the mobile station.

7. (Amended) The [A] method [according to] of claim 1, [characterized in that] further comprising:

executing a Service Logic Program in a Service Logic Execution Environment to send [sending said] the charging [credit/charging] information [is triggered by a Service Logic Program being executed in a Service Logic Execution Environment (SLEE) in] at [the] a Service Control Point [(SCP)]; and

[the Service Logic Program provides functionality for] communicating with an external process through a gateway between services running inside the Service Logic Execution Environment [(SLEE)] and an external application, [(WS); and]

wherein the [credit/charging] charging information is sent using the gateway to the external application [(WS) which sends it] and subsequently to the mobile station [(MS)].

8. (Amended) An arrangement [(SCP, WS)] for transmitting [credit/charging] charging information to a mobile station [(MS)] in a mobile telecommunications network [; characterized in that the arrangement (SCP, WS) is adapted to:] , wherein the arrangement is configured to detect a termination [(2-10)] of a call chargeable to [the] a subscriber of the mobile station [(MS);] and , in response to [said detecting,] that detection, send [said] the [credit/charging] charging information to the mobile station [(MS)] as a connectionless message [(2-26)].

9. (Amended) The [An] arrangement [according to] of claim 8,
[c h a r a c t e r i z e d in that the arrangement comprises] comprising a Service
Control Point [(SCP)] of an Intelligent Network, [said] the Service Control Point
[comprising] including a Service Logic Program [for sending said] configured to send
the [credit/charging] charging information in response to [said] detection of
[detecting] the call termination.

10. (Amended) The [An] arrangement [according to] of claim 9,
[c h a r a c t e r i z e d in that the arrangement] further [comprises] comprising a
separate processor [(WS) for formatting said] configured to format the
[credit/charging] charging information.

JC03 Rec'd PCT/PTO 29 MAR 2001

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re PATENT APPLICATION OF

Confirmation No.: Not Yet Assigned

LINDEMANN

Group Art Unit: Not Yet Assigned

Appln. No.: Not Yet Assigned

Examiner: Not Yet Assigned

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CREDIT/CHARGING INFORMATION TO A MOBILE
COMMUNICATION STATION (As Amended)

March 19, 2001

* * * * *

PRELIMINARY AMENDMENT

Hon. Commissioner of Patents
Washington, D.C. 20231

Sir:

Kindly preliminary amend the above-referenced application as follows:

IN THE TITLE:

Please delete the present title and replace it with the following new title:

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CREDIT/CHARGING INFORMATION TO A MOBILE COMMUNICATION
STATION--.

IN THE SPECIFICATION:

At the top of the first page, just under the title, insert

--This application is the National Phase of International Application
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International Application was published under PCT Article 21(2) in English.--

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JCO2 Rec'd PCT/PTO 29 MAR 2001

WO 00/19700

PCT/FI99/00796

Reporting credit/charging information to a mobile subscriber

Background of the invention

The invention relates to methods and equipment for reporting charging information to mobile subscribers, including, for example reporting the amount of available credit to prepaid subscribers. In mobile communications systems, such as GSM, the use of prepaid SIM (Subscriber Identity Module) cards is increasing. Prepaid SIM cards relieve the network operators of credit losses. They enable parents to set an upper limit for the telephone bill of their children beforehand. As a third benefit, they enable roaming subscribers to pay their local calls with local tariffs, whereas the use of the SIM card of their home operator results in paying international tariffs to their home network and back.

A problem with prepaid SIM cards is that current mobile stations (handsets) are not provided with means for automatically displaying credit-related information, such as the current credit status, immediately after the end of a call. Some operators allow the subscribers to call an Interactive Voice Response (IVR) service which reports the available credit by synthesized speech. Such a service causes another problem: using the IVR causes a significant amount of overhead traffic in the radio interface. This non-chargeable traffic consumes resources which could be better spent on chargeable calls.

Disclosure of the invention

An object of the invention is to provide a mechanism for reporting the available credit status for prepaid subscribers in a way which allows reducing the overhead traffic load in the radio interface. To discourage users from calling the IVR, the mechanism according to the invention must be fast enough, so that the users will not experience annoying delays. These objects are achieved with a method and equipment which are characterized by what is disclosed in the attached independent claims. Preferred embodiments of the invention are disclosed in the attached dependent claims.

According to one embodiment, at call termination, a service logic program (SLP) handling the call in a Service Control Point (SCP) sends the credit information (e.g. via a LAN connection) to a program running on a separate processor or workstation WS. This program then reformats and passes on the information (e.g. via another LAN) to the Short Message Service Center (SMSC), which sends the actual short message to the mobile station. The LAN

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connections can be standard TCP/IP connections. The protocol between the SCP and the workstation can be a specific protocol which is used via an Applications Programming Interface (API). The protocol used between the WS and e.g. Nokia's SMSC is called Computer Interface to Message Distribution-2 (CIMD-2). The program running on the workstation is typically written in C++.

5 To use the API, the programmer has to insert statements in the Service Logic Program (SLP) and write a separate C++ program for receiving the information. CIMD-2 is a simple character based protocol, where a client process makes requests to the server and the server responds.

10 The basic idea behind the solution is to utilise both the above-mentioned interfaces to make a direct connection from the SCP to the SMSC, thus reducing the time delay from the termination of the call to the time the information is sent as an SMS. This short time is the main advantage of this solution, and experiments performed by the inventor in a test platform have

15 shown that the mobile station can receive the short message in 1 to 5 seconds from the termination of the call.

Optionally, releasing the call will be delayed whereby the message according to the invention can be delivered without a separate page message.

Preferably, the information is extracted from the SCP, because no

20 problems due to propagation delay arise. The SLPs (Service Logic Programs handling the calls) being executed on the SCP provide functionality for communicating with an external process through a gateway between services running inside the Service Logic Execution Environment (SLEE) and external applications. More specifically, the SLPs can send messages to an external

25 process via a socket. The external process runs on a separate computer or workstation, and therefore it does not influence the performance of the SCP. The SLP handling a prepaid call runs during the whole call, since it controls credit updating. This means it will know when the call has finished. The information needed by the external process could then be sent out by adding some

30 SLP code at the end of the prepaid SLP.

Yet another solution is to use the SS7 network for sending the information between the SCP and the SMSC. This solution apparently requires the use of the MAP protocol. As an advantage, no new elements (network connections, programs) would be introduced.

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Brief description of the drawings

The invention will be described in more detail by means of preferred embodiments with reference to the appended drawing wherein:

Fig. 1 is a block diagram of a mobile communications network
5 equipped with an arrangement according to a preferred embodiment of the invention;

Fig. 2 is a signalling diagram illustrating one embodiment of the invention; and

Fig 3 depicts a mobile station after receiving and displaying a short
10 message according to the invention.

Detailed description of the invention

Fig. 1 is a block diagram of a mobile communications network equipped with an arrangement according to a preferred embodiment of the invention. This embodiment makes use of Intelligent Network technology. An
15 intelligent network (IN) is able to provide a subscriber of a telecommunications network, such as a wired network or a mobile telephone network, with a plurality of various services. Such services include a virtual private network (VPN) which allows the use of short numbers between subscribers belonging to a local network, and a personal number in which the intelligent network reroutes
20 the calls directed to a personal number in a manner controlled by the subscriber. An example of such an intelligent network is described in recommendations of the ITU-T Q-1200 series, of which Q-1210 to Q-1219 define a set of features known as CS-1 (Capability Set 1), and correspondingly, Q-1220 to Q-1229 define a set of features CS-2. The invention and its background will be
25 described by the terminology of recommendation ETS 300 374-1 CoreINAP, but the invention can also be employed in intelligent networks implemented according to other intelligent network standards.

A basic call state model (BCSM), defined in connection with the intelligent network, describes different stages of call control and defines the
30 points in which call control can be interrupted in order to start an intelligent network service. It identifies the detection points in the call and connection process in which service logic entities of the intelligent network can have an interactive relationship with basic call and connection management features.

In conventional call set-up which takes place without the help of an
35 intelligent network, telephone exchanges make independently all the deduc-

tions about call routing. One or more service control functions (SCF) are associated with intelligent network architecture. The equipment or network element carrying out the tasks determined for the SCF is called a service control point (SCP). In the present invention, the SCF and the SCP are equal, and will
5 hereinafter be called the SCP. The SCP gives call set-up instructions to the exchange, or the exchange may inquire call set-up instructions from the SCP. If the interface of subscriber B is found to be busy at some stage of call set-up, for example, the call can be directed to an alternative number. Service data function SDF and service data point SDP form a database comprising sub-
10 scriber-specific and/or service-specific information.

A service switching function (SSF) is an interface between the call control function CCF and the service control function SCF. The network element performing the SSF is called a service switching point (SSP). An intelligent network service is produced by the service switching point SSP inquiring
15 instructions from the service control point SCP by means of messages to be transmitted across the SSP/SCP interface upon the encounter of detection points associated with the services. In intelligent network terminology these messages are called operations. In association with an intelligent network service, a service program is started at the service control point SCP, the operation of the program determining the operations transmitted by the SCP to
20 the SSP at each stage of a call.

Fig. 2 is a signalling diagram illustrating a preferred embodiment of the invention. The scenario shown in Fig. 2 begins in step 2-0 wherein the MS sends CALL SETUP signalling to the MSC. In this example, it will be assumed
25 that call establishment takes place under IN control, but this is not necessary to the invention. Another assumption, made here, is that the IN is also responsible for keeping track of the available credit of the prepaid SIM card. In step 2-2, the MSC sends the SCP an INITIAL DETECTION POINT (IDP) message, the parameters of which comprise a Service key Skey1 and the calling and called
30 party numbers A# and B#. Service key Skey1 identifies the IN service in question. In step 2-4, the SCP sends the MSC a REQUESTREPORTBCSMEVENT message, indicating which detection points the MSC must report to the SCP. One such interesting detection point is the one that concerns termination of calls. In step 2-6, the SCP sends the MSC a CONTINUE message which directs
35 the MSC to route the call normally. (Alternatively, the SCP might send a CONNECT message indicating an alternative number, but such variations are

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irrelevant to understanding the actual invention.) Step 2-8 comprises all the necessary steps for call establishment to the called party B. For clarity, such routine steps are not shown separately. In step 2-10, the MS terminates the call by sending a DISCONNECT message. In step 2-12, the MSC sends the SCP
5 an EVENTREPORTBCSM message indicating disconnection from the originating side. In step 2-14 the SCP returns a FURNISHCHARGINGINFORMATION message to the MSC. In response to the CONTINUE message in step 2-16, the MSC releases the resources allocated to the call in step 2-18. Again, such routine steps are not shown separately.

10 According to one embodiment of the invention, in step 2-20, the MSC sends the SCP a second IDP message, having as its parameters a second Service key (Skey2) and the calling party number A#. Service key Skey2 identifies the supplementary service which indicates the available credit to the prepaid subscriber. The next two steps make use of a separate workstation
15 WS, although these steps could also be implemented by means of a process being executed in the SCP. Next, in step 2-22, the SCP sends the WS a message requesting the WS to format a short message indicating the credit information. Preferably, the credit information comprises the duration and price of the last call, and the amount and lifetime of available credit. In step 2-24 the
20 WS sends this information to the Short Message Service Center SMSC, which, in step 2-26 sends it to the MS in a suitably formatted short message.

Fig. 3 shows a mobile station MS after it has received and displayed the short message of step 2-24. In a bilingual or multilingual country like Finland or Switzerland, the workstation SW might make use of the subscriber's
25 language (stored in the HLR) and format the message accordingly.

Based on the above example, several variations will be obvious to a skilled reader. For example, it was assumed that the SCP takes care of both call processing and keeping track of the available credit of the prepaid SIM card, and that the SCP stores the available credit to an IN database called
30 Service Data Point (SDP, not shown separately). This is why the available credit did not have to be transferred to the SCP at the beginning of the call. Of course, keeping track of the available credit can take place in the MSC, whereby the IN call control (steps 2-2 to 2-6 and 2-12 to 2-16) is unnecessary. Alternatively, the SCP could perform call control but the MSC might keep track
35 of the prepaid credit. In this case, only step 2-14 is unnecessary.

As a yet further alternative, the IN call control and the credit reporting according to the invention could be integrated so that sending the CONTINUE message to the MSC in step 2-16 would also trigger sending the FORMATSHORTMESSAGE message to the WS in step 2-22. In other words, the message in step 2-20 is unnecessary. However, for reasons of compatibility with different implementation options, in the example shown in Fig. 2, the SCP reports the credit information to the MSC in step 2-14, and the MSC returns the credit information back to the SCP in step 2-20. In this way, the credit reporting service according to the invention (steps 2-20 to 2-26) is compatible with all combinations of call control and credit tracking under the MSC or the SCP.

Although sending the credit information as a short message is considered the best mode, other transmission channels could be used. A possible alternative transmission method is the use of USSD (Unstructured Supplementary Service Data), which is defined in references 2 to 4. However, network-initiated USSD is only possible with Phase-2 mobile stations. Short message transmission and USSD transmission can be commonly referred to as connectionless transmissions because the information is simply transmitted to the recipient, without the establishment of an end-to-end connection.

The invention can be used for transmitting any kind of credit/charging information the transmission of which is triggered in response to ending a call. Preferably, the credit/charging information comprises the current credit status, the duration of the last call, the price of the last call and the validity period of the SIM card. Although the invention has been described in connection with prepaid subscriptions, it is not a strict requirement that the subscription is prepaid. As an alternative, subscribers may wish to set an upper limit for the monthly telephone bill. Thus, even if a mobile telephone is stolen, the amount of damage could be restricted to the predefined upper limit, and parents can set an upper limit to the monthly telephone bill of their children. The invention is equally suitable for transmitting the available charging limit (the predefined upper limit minus the accumulated, but not yet invoiced, charge).

References:

1. GSM 02.90: European digital cellular telecommunications system (Phase 2); Stage 1 description of Unstructured Supplementary Service Data (USSD)

2. GSM 03.90: Digital cellular telecommunications system (Phase 2); Unstructured Supplementary Service Data (USSD) - Stage 2
3. GSM 04.90: European digital cellular telecommunications system (Phase 2); Unstructured Supplementary Service Data (USSD) - Stage 3

5

All references are incorporated herein by reference.

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Claims

1. A method for transmitting credit/charging information to a mobile station (MS);

- 5 characterized in that the method comprises the steps of:
detecting a termination (2-10) of a call chargeable to the subscriber of the mobile station (MS);
in response to said detecting, sending said credit/charging information to the mobile station (MS) as a connectionless message (2-26).

2. A method according to claim 1, characterized in that the method
10 further comprises the steps of:

- defining an upper limit for the accumulated price of telephone calls;
- monitoring the accumulated price of telephone calls;
- allowing a new call only if the accumulated price of telephone calls is less than the upper limit.

15 3. A method according to any of the preceding claims, characterized in that said connectionless message is a short message.

4. A method according to any of the preceding claims, characterized in that said connectionless message is a USSD message.

20 5. A method according to any of the preceding claims, characterized in that after detecting said termination (2-10) of the call, releasing the call (2-18) with sufficient delay for sending said connectionless message without paging the mobile station (MS) separately.

6. A method according to any of the preceding claims, characterized in that an Intelligent Network node, preferably a Service Control
25 Point (SCP):

requests (2-4) a Mobile Services Switching Centre (MSC) to report said termination of call; and

in response to said reporting (2-12), initiates (2-16, 2-22) said sending of said credit/charging information.

30 7. A method according to claim 6, characterized in that

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sending said credit/charging information is triggered by a Service Logic Program being executed in a Service Logic Execution Environment (SLEE) in the Service Control Point (SCP);

the Service Logic Program provides functionality for communicating
5 with an external process through a gateway between services running inside the Service Logic Execution Environment (SLEE) and an external application (WS); and

the credit/charging information is sent using the gateway to the external application (WS) which sends it to the mobile station (MS).

10 8. An arrangement (SCP, WS) for transmitting credit/charging information to a mobile station (MS) in a mobile telecommunications network; characterized in that the arrangement (SCP, WS) is adapted to:

detect a termination (2-10) of a call chargeable to the subscriber of
15 the mobile station (MS); and

in response to said detecting, send said credit/charging information to the mobile station (MS) as a connectionless message (2-26).

9. An arrangement according to claim 8, characterized in
that the arrangement comprises a Service Control Point (SCP) of an Intelligent
20 Network, said Service Control Point comprising a Service Logic Program for sending said credit/charging information in response to said detecting.

10. An arrangement according to claim 9, characterized in that the arrangement further comprises a separate processor (WS) for formatting said credit/charging information.

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Fig. 1

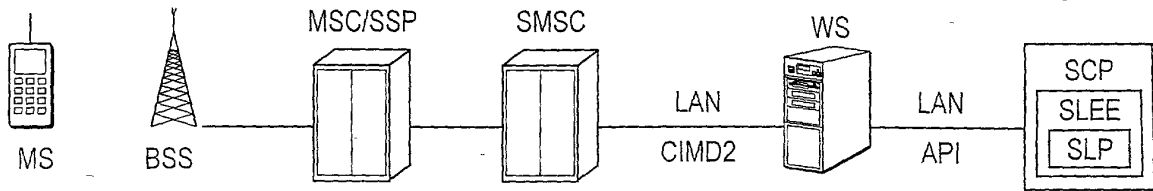


Fig. 2

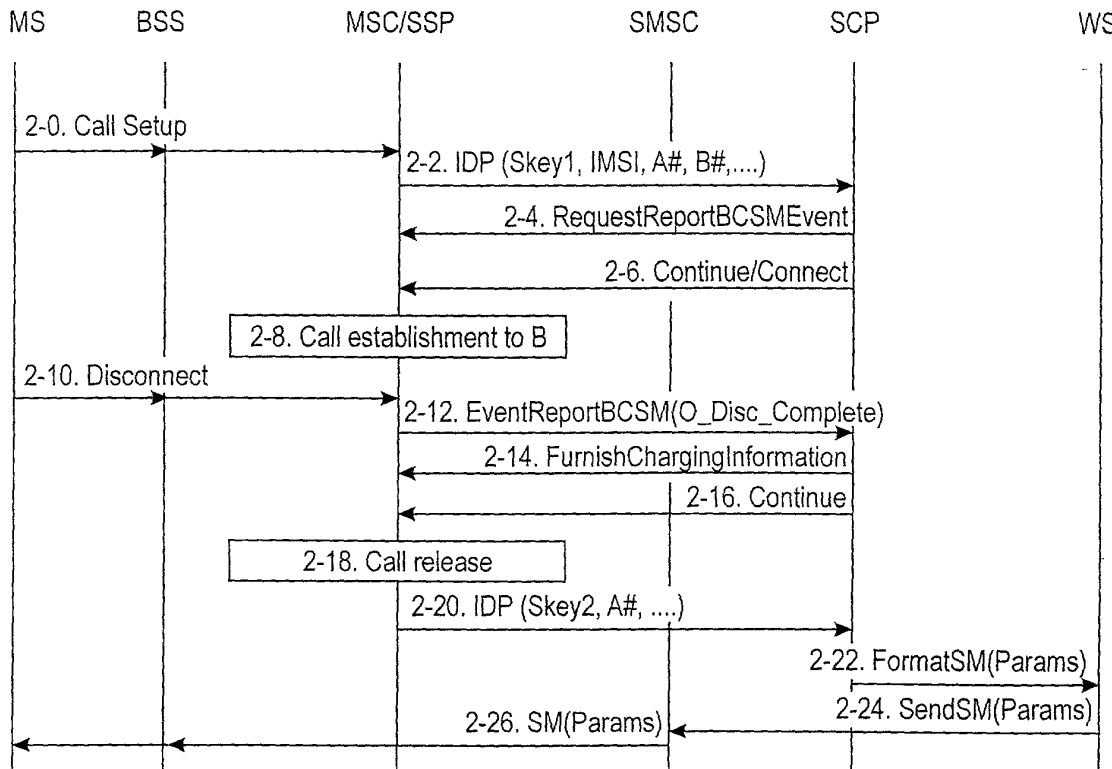
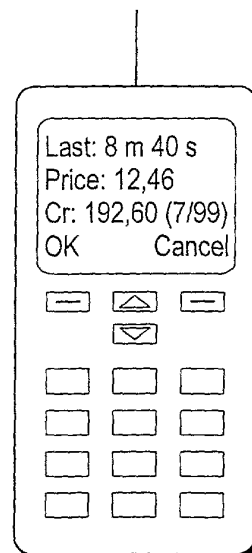


Fig. 3



FOR UTILITY/DESIGN
CIP/PCT NATIONAL/PLANT
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DECLARATIONS

RULE 63 (37 C.F.R. 1.63)
DECLARATION AND POWER OF ATTORNEY
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FORM

As a below named inventor, I hereby declare that my residence, post office address and citizenship are as stated below next to my name, and I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the INVENTION ENTITLED _____
Reporting credit/charging information to a mobile subscriber

the specification of which (CHECK applicable BOX(ES))
X A. ☐ is attached hereto
BOX(ES) B. ☐ was filed on _____ as U.S. Application No. /
→ C. x was filed as PCT International Application No. PCT/FI99 /00796 on 28 September 1999
and (if applicable to U.S. or PCT application) was amended on _____

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above. I acknowledge the duty to disclose all information known to me to be material to patentability as defined in 37 C.F.R. 1.56. Except as noted below, I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT International Application which designated at least one other country than the United States, listed below and have also identified below any foreign application for patent or inventor's certificate, or PCT International Application, filed by me or my assignee disclosing the subject matter claimed in this application and having a filing date (1) before that of the application on which priority is claimed, or (2) if no priority claimed, before the filing date of this application

PRIOR FOREIGN APPLICATION(S)

Number	Country	Day/MONTH/Year Filed	Date first Laid-open or Published	Date Patented or Granted	Priority NOT Claimed
982098	FI	29 September 1998			

If more prior foreign applications, X box at bottom and continue on attached page.

Except as noted below, I hereby claim domestic priority benefit under 35 U.S.C. 119(e) or 120 and/or 365(c) of the indicated United States applications listed below and PCT international applications listed above or below and, if this is a continuation-in-part (CIP) application, insofar as the subject matter disclosed and claimed in this application is in addition to that disclosed in such prior applications, I acknowledge the duty to disclose all information known to me to be material to patentability as defined in 37 C.F.R. 1.56 which became available between the filing date of each such prior application and the national or PCT international filing date of this application

PRIOR U.S. PROVISIONAL, NONPROVISIONAL AND/OR PCT APPLICATION(S)

Application No. (series code/serial no.)	Day/MONTH/Year Filed	Status pending, abandoned, patented	Priority NOT Claimed
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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

And I hereby appoint Pillsbury Winthrop LLP, Intellectual Property Group, 1100 New York Avenue, N.W., Ninth Floor, East Tower, Washington, D.C. 20005-3918, telephone number (202) 861-3000 (to whom all communications are to be directed), and the below-named persons (of the same address) individually and collectively my attorneys to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith and with the resulting patent, and I hereby authorize them to delete names/numbers below of persons no longer with their firm and to act and rely on instructions from and communicate directly with the person/assignee/attorney/firm/ organization who/which first sends/sent this case to them and by whom/which I hereby declare that I have consented after full disclosure to be represented unless/until I instruct the above firm and/or a below attorney in writing to the contrary

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"X" box ☐ FOR ADDITIONAL INVENTORS, and proceed on the attached page to list each additional inventor.

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